Medscape Medline Abstract

The formation of competent barrier lipids in reconstructed human epidermis requires the presence of vitamin C.

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Our analysis of epidermal lipids revealed that (glucosyl)ceramide profiles in various human skin equivalents are different from those of native tissue. The main difference is the reduced content in skin equivalents of ceramides 4-7 and especially the very low content of the most polar ceramides 6 and 7, which contain hydroxylated sphingoid base and/or fatty acid. To facilitate hydroxylation, the culture medium was supplemented with vitamins C and E. Although in vitamin E-supplemented medium lipogenesis was not affected, in vitamin C-supplemented medium the content of glucosylceramides and of ceramides 6 and 7 was markedly increased, both in the presence and absence of serum and irrespective the substrate used (inert or natural, populated or not with fibroblasts). The improvement of the lipid profile was accompanied by a marked improvement of the barrier formation as judged from extensive production of lamellar bodies, their complete extrusion at the stratum granulosum/stratum corneum interface, and the formation of multiple broad lipid lamellar structures in the intercorneocyte space. The presence of well-ordered lipid lamellar phases was confirmed by small-angle x-ray diffraction. Some differences between native and reconstructed epidermis, however, were noticed. Although the long-range lipid lamellar phase was present in both the native and the reconstructed epidermis, the short lamellar phase was present only in native tissue. It remains to be established whether these differences can be ascribed to small differences in relative amounts of individual ceramides, to differences in fatty acid profiles, or to differences in cholesterol sulfate, pH, or calcium gradients. The results indicate the key role vitamin C plays in the formation of stratum corneum barrier lipids.

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